

- (21) Application No 7939051
 (22) Date of filing 12 Nov 1979
 (30) Priority data
 (31) 78/44188
 (32) 13 Nov 1978
 (33) United Kingdom (GB)
 (43) Application published 20 Aug 1980
 (51) INT CL³
 A61G 7/00
 (52) Domestic classification
 A4J 11G 12A 12G
 H5R 10
 (56) Documents cited
 GB 1534875
 GB 1494486
 GB 1306353
 GB 1286252
 GB 1208726
 GB 1093311
 GB 894543
 GB 685883
 GB 630113
 GB 523334
 GB 514525
 GB 245197
 (58) Field of search
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- (54) **An apparatus for supporting a patient**
 (57) An apparatus 1, Fig. 1, e.g. a nursing or orthopaedic bed, for supporting a patient comprises a rigid undercarriage 2 carrying a rigid frame 7 turnable, e.g. pivotable, about a horizontal axis. A further rigid frame 3 is slidably and/or removably supported

on the frame 7 and can be releasably locked thereto by first locking means 100, Fig. 4. The frame 7 carries patient-supporting frames 4, 5 which are rotatable about a longitudinal axis of the apparatus through at least 180° and which can be releasably locked in one or more predetermined positions by second locking means 50.

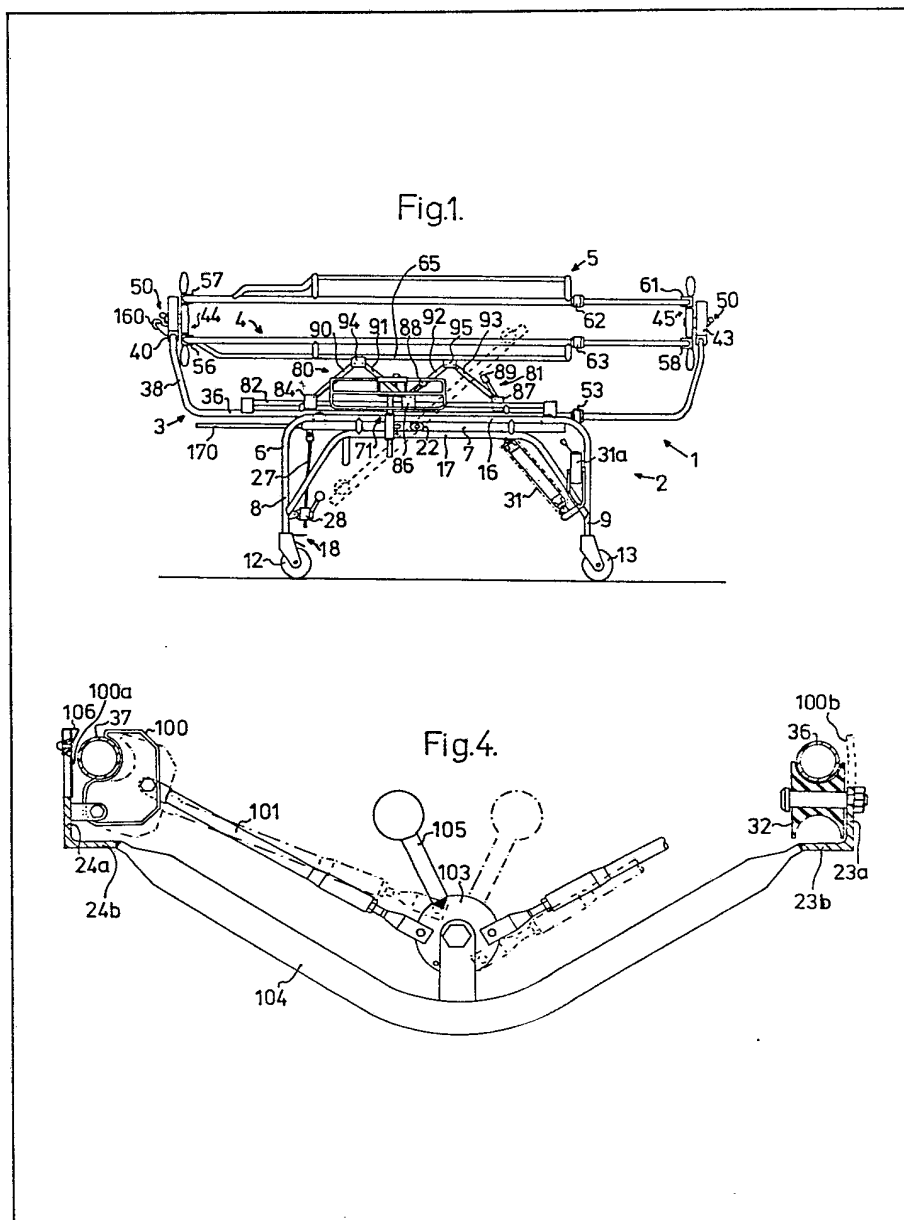


Fig.1.

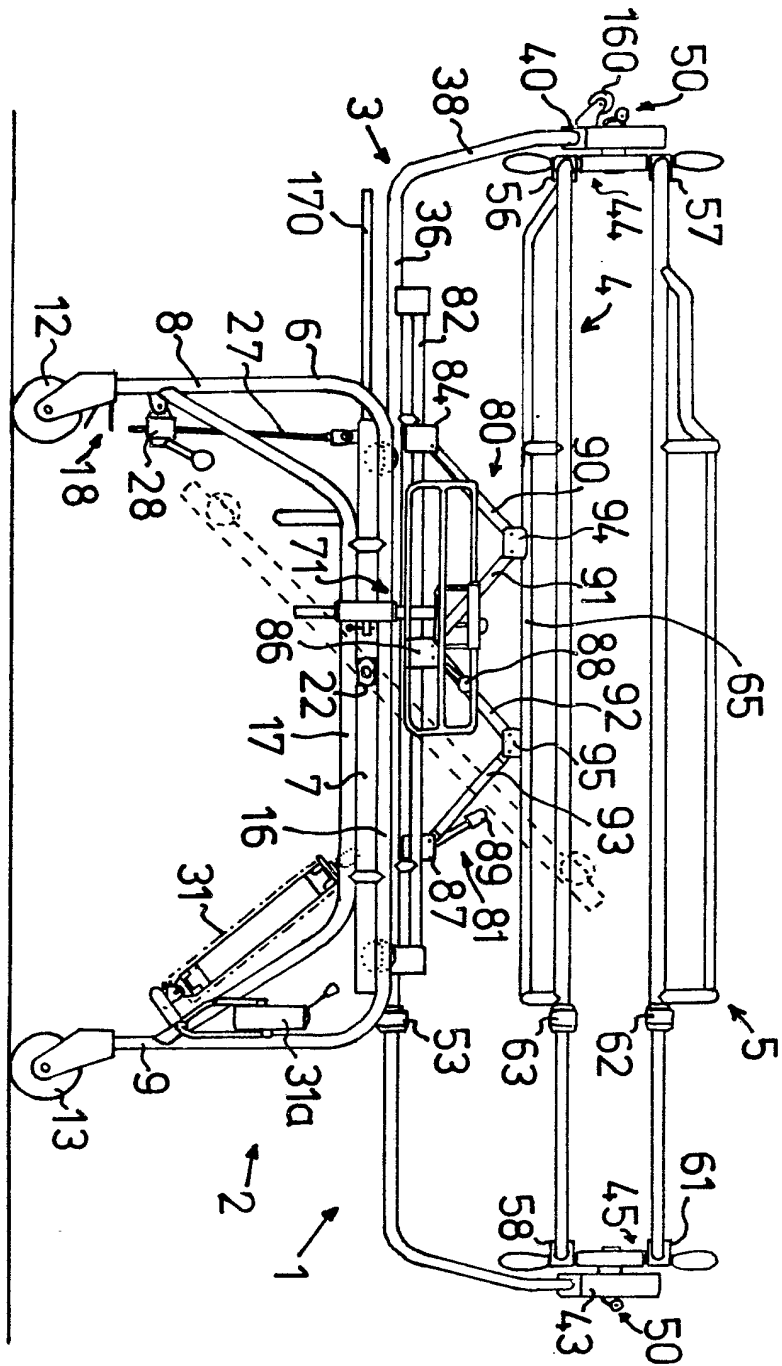
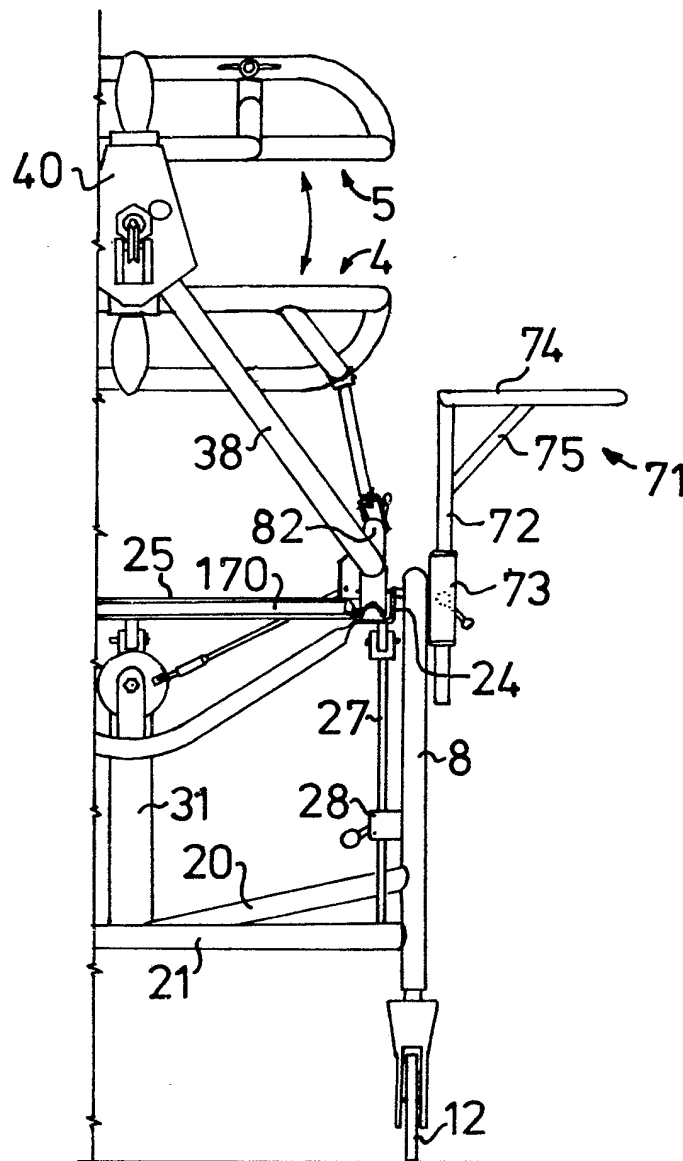


Fig. 2.



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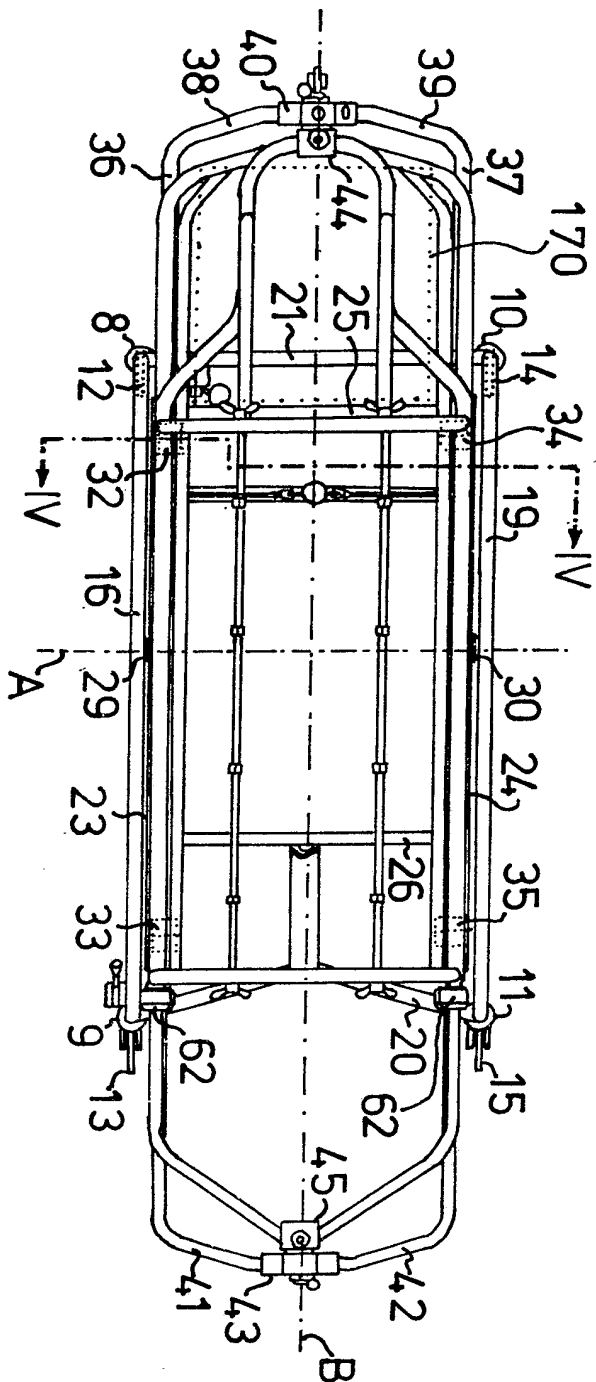
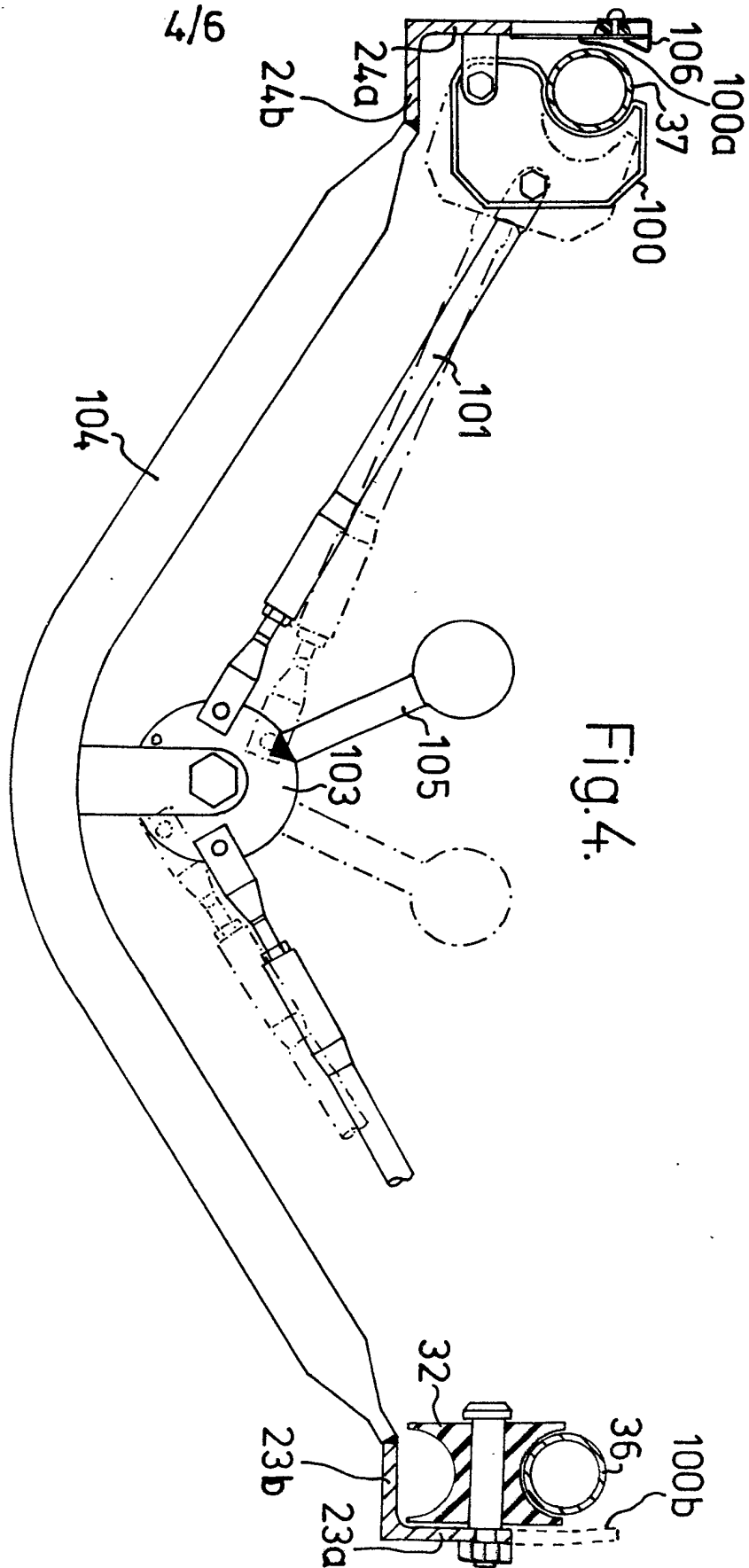


Fig. 3.



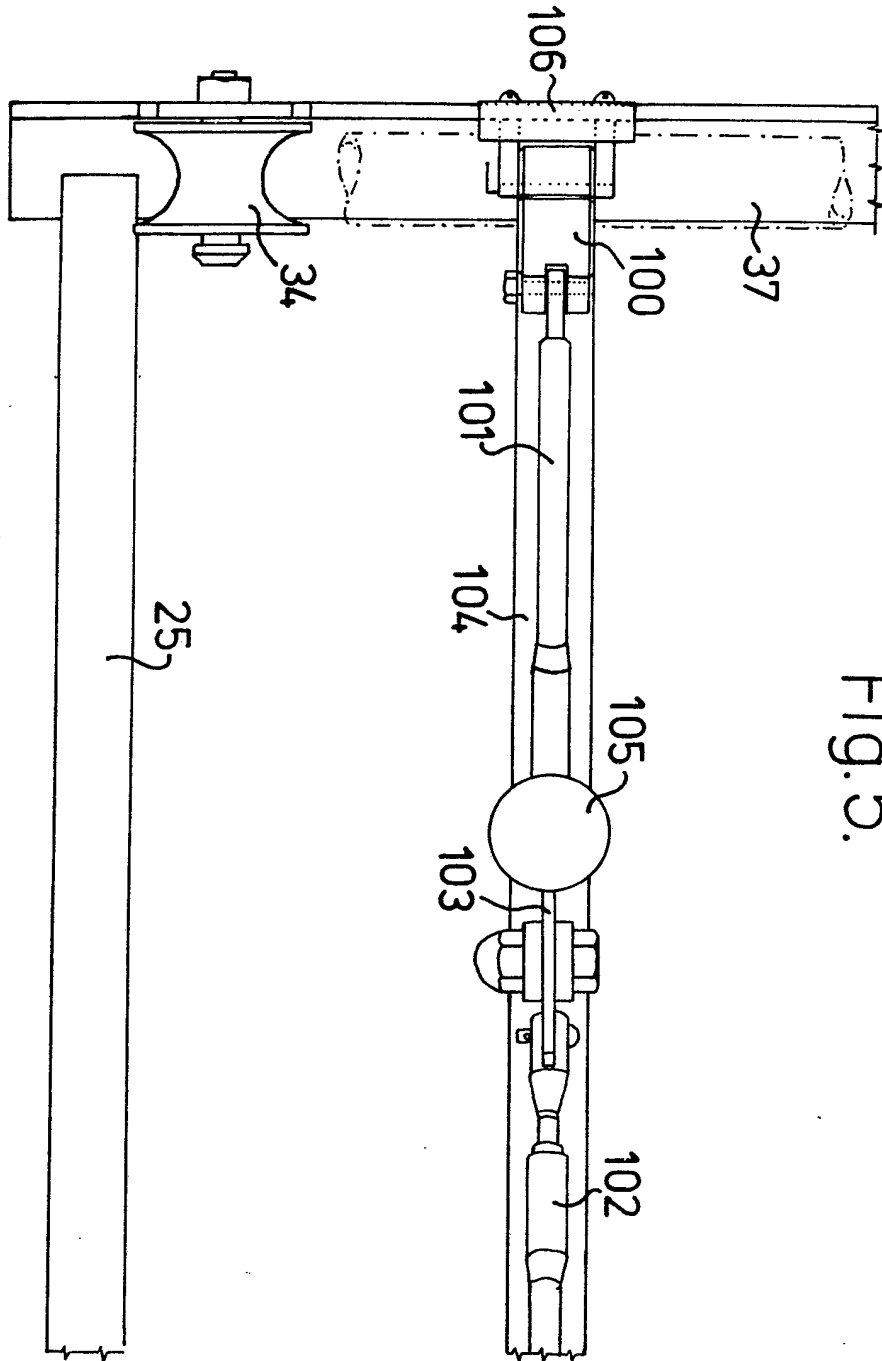


Fig. 5.

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Fig. 6a.

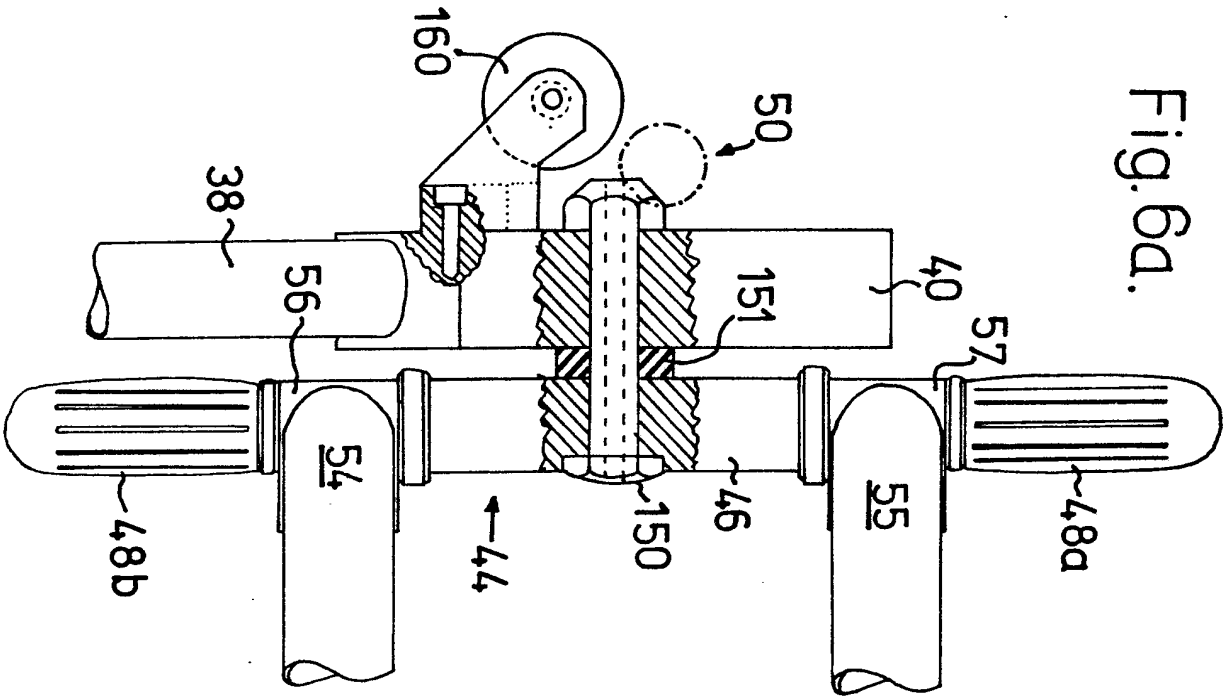
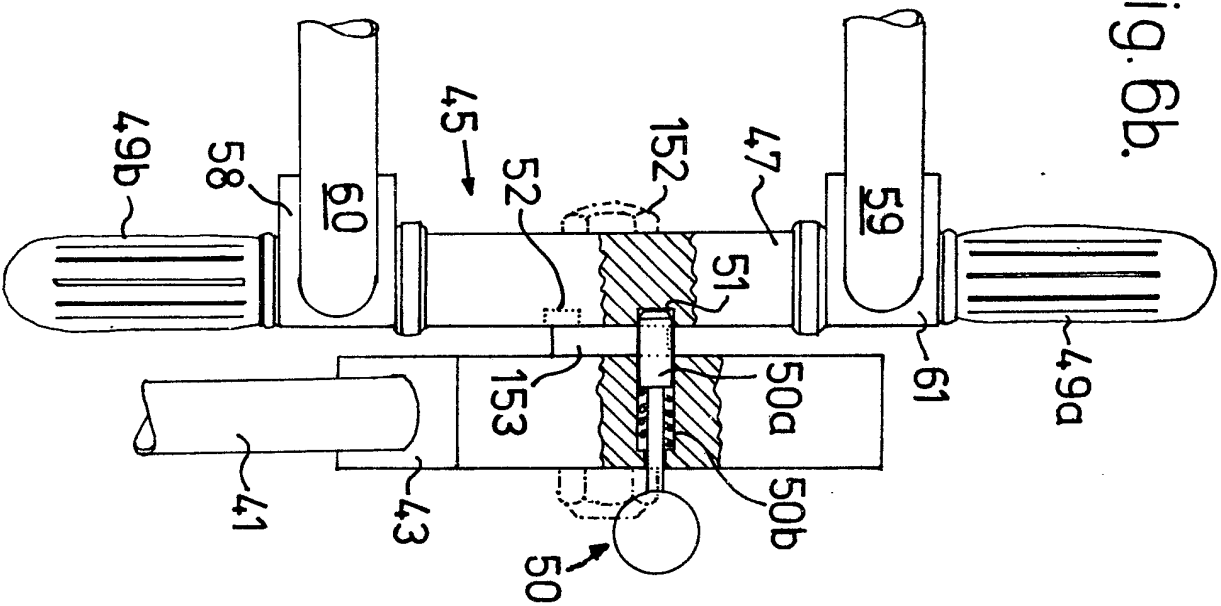


Fig. 6b.



SPECIFICATION

An apparatus for supporting a patient

This invention relates to an apparatus, e.g., a nursing or orthopaedic bed, for supporting a patient and more particularly to such an apparatus whereby a patient can be supported for turning around the lengthwise axis of the patient through at least 180° and for turning around a transverse axis perpendicular to said lengthwise axis. Such an apparatus may typically be used for X-raying a patient having severe injuries, e.g., a broken back, where it is essential to provide good support of the patient to prevent further injury during manoeuvring of the patient to obtain different views of the X-raying for traction, and for spinal injection while at the patient is inclined, e.g. at 35° to the horizontal.

According to one aspect of the invention an apparatus, e.g. a nursing or orthopaedic bed, for supporting a patient comprises a rigid undercarriage carrying a rigid first frame turnable about a horizontal first axis, a rigid second frame slidably supported on said first frame and extending longitudinally in a direction perpendicular to said first axis, first releasable locking means for locking the second frame in different positions on said first frame, patient-supporting means carried by said second frame and rotatable about a second axis parallel to the longitudinal direction of said second frame for turning a patient, supported in said patient-supporting means parallel to said second axis, through at least 180°, and second releasable locking means for locking the patient-supporting means in one or more predetermined positions.

Suitably rollers, e.g. having grooved circumferential rims, are provided for facilitating sliding of the second frame relative to the first frame. Conveniently these rollers are rotatably fixed to the first frame.

The first releasable locking means may comprise a pair of brake shoes which are movable against, or away from, different ones of a pair of spaced apart parallel rails of said second frame which are adapted to be supported by said rollers. Typically each brake shoe is movable to clamp each of the parallel rails against a respective brake pad fixed to the first frame. Conveniently the brake shoes are moved together into or out of contact with the parallel rails.

Suitably, the first frame is pivoted to the rigid under-carriage. However it is possible for the first frame to be turnably supported in a cradle-like support provided in the undercarriage.

According to another aspect of the invention an apparatus for supporting a patient comprises a rigid undercarriage carrying a rigid first frame turnable about a horizontal first axis, a rigid second frame detachably supported on said first frame and extending longitudinally in a direction perpendicular to said first axis, first releasable locking means for locking the second frame to said first frame, patient-supporting means carried by said second frame and rotatable about a second

axis parallel to the longitudinal direction of said second frame for turning a patient, supported in said patient-supporting means parallel to said second axis, through at least 180°, and second releasable locking means for locking the patient-supporting means in one or more predetermined positions.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a side view of an apparatus according to the invention,

Figure 2 is an end view of part of the apparatus shown in Figure 1 on an enlarged scale,

Figure 3 is a plan of the apparatus shown in Figure 1 but with the arm rests of the apparatus omitted,

Figure 4 is a sectional view, on an enlarged scale, taken on the line IV—IV of Figure 3 and showing a detail of the apparatus,

Figure 5 is a partial plan, on an enlarged scale, of the understructure of the apparatus shown in Figure 1, and

Figures 6a and 6b are partly sectioned side views, on enlarged scales, of parts of the apparatus shown in Figure 1.

Figure 1 shows a general nursing or orthopaedic bed 1 comprising an understructure generally designated by the reference numeral 2, a rigid supporting frame, generally designated by the reference numeral 3, carried by the understructure 2, and a pair of rigid, patient-supporting frames generally designated by the reference numerals 4 and 5.

The understructure 2 consists of a rigid wheeled tubular undercarriage 6 pivotally carrying a rigid or first frame 7. The undercarriage 6 has four substantially upright legs 8, 9, 10 and 11 (see Figures 2 and 3) each provided at their lower ends with wheels 12, 13, 14 and 15, respectively. Suitably at least one wheel at each end of the undercarriage 6 is provided with a conventional brake 18. The pair of legs 8 and 9 are connected by upper and lower longitudinally extending elements 16 and 17, respectively. A similar pair of elements (only the upper element 19 of which can be seen in Figure 3) is disposed parallel to the elements 16 and 17 and connects the pair of legs 10 and 11. A cross element 20 connects the lower ends of the legs 9 and 11 at one end of the undercarriage 6 and a further cross element 21 connects the lower ends of the legs 8 and 10 at the other end of the undercarriage 6.

The turnable frame 7 comprises a pair of spaced apart, longitudinally extending, parallel angle elements 23 and 24 disposed with one flange (23a, 24a — see Figure 4) of each angle element extending vertically upwards and the other flanges (23b, 24b — see Figure 4) of the angle elements extending inwardly towards each other. A transverse element 25 connects one end of the elements 23 and 24 and a further transverse element 26 connects the elements 23 and 24 adjacent their other ends to define with the elements 23 and 24 a substantially

rectangular frame. In order to strengthen this rectangular frame, curved, tubular braces (not shown) may be connected to opposite ends of the transverse elements 25 and 26, respectively. The turnable frame 7 is pivotally supported on the under-carriage 6 by means of a pair of stub shafts 29 and 30 which pass through holes provided in the flanges 23a, 24a and through holes in a pair of bosses 22 (only one of which can be seen in Figure 1) provided substantially midway between the ends of, and adjacent the top of, the undercarriage 6. A fluid e.g. hydraulic fluid, actuated ram 31, operated from a valve 31a, is pivotally connected between the cross element 20 and the transverse element 26 to effect pivotal movement of the frame 7 relative to the undercarriage 6 about a transverse axis A (see Figure 3) containing the axes of the stub shafts 29 and 30. A rod 27 is pivotally connected to the frame 7 adjacent the corner where elements 23 and 25 meet. The rod 27 passes through locking means 28 pivotally fixed to the undercarriage 6, e.g. to leg 8, which locking means is actuable to enable the frame 7 to be locked in, or released from, a desired horizontal position (as shown in full lines in Figure 1) or any desired inclined position (e.g. as shown in dashed lines in Figure 1). Rollers 32 and 33 (34 and 35) having concavely curved rims are provided at opposite ends of the angle element 23 (24), each roller being mounted on the flange 23a (24a) for rotation about a horizontal axis.

The rigid supporting or second frame 3 comprises a pair of spaced apart, longitudinally extending, parallel tubular rails 36 and 37 which are adapted to rest on the rollers 32, 33 and 34, 35, respectively. Tubular elements 38 and 39 are integrally joined to one end of the rails 36 and 37, respectively, and extend inwardly and upwardly to meet at a block 40. The opposite ends of the rails 36 and 37 are connected to similar elements 41 and 42, respectively, which extend inwardly and upwardly to meet at a block 43. However the elements 41 and 42, instead of being integrally joined to the rails 36 and 37, are telescopically connected thereto to enable adjustment of the length of the frame 3. Once the length of the frame has been suitably adjusted, releasable locking means 53 can be actuated so that the parts of the frame 3 are releasably locked together.

As seen in Figure 6a, a support member 44 is rotatably connected to the block 40 by a tubular bolt 150, the support member being spaced axially inwardly from the block 40 by a spacer washer 151. A similar support member 45 is rotatably connected to the block 43 by a solid bolt 152 (see Figure 6b), the support member 45 being spaced axially inwardly from the block 43 by a spacer washer 153. The support members 44 and 45 are rotatably about a common longitudinal axis B (see Figure 3). The provision of the tubular bolt enables a wire or cord (not shown) to be passed therethrough and over a pulley wheel 160 rotatably fixed to the block 40. This enables

traction to be performed on a patient supported in the bed 1. Each support member 44 (45) consists of a central block 46 (47) having screw-threaded spindles (not shown) which extend from opposite ends of the central block 46 (47), are aligned with one another and on which handles 48a, 48b (49a, 49b) are screwed for purposes to be explained hereinafter. Locking means 50 are provided for locking each support member 44 (45) in either of two positions in which the handles 48a, 48b (49a, 49b) are disposed vertically. Each locking means 50 comprises a shaft 50a (see Figure 6b) received in a counterbored hole 50b provided in each block 40 (43) and having a knob on one of its ends. The other end of each shaft extends inwardly and is receivable in either of two diametrically opposed holes 51, 52 provided in each block 46 (47). Each shaft 50a, which is axially movable and spring biased into an innermost position, can thus be positioned between a locking position, in which the end of the shaft 50a is received in one of the holes 51, 52, and an unlocking position, in which the end of the shaft 50a is not received in either of the holes 51, 52.

The patient-supporting frames 4 and 5 are carried by the support members 44 and 45. Each frame 4 (5) includes, at one of its ends, shaped tubular elements 54 (55) — see Figure 6a — which meet at a block 56 (57) having a hole (not shown) formed therein. The other end of each frame 4 (5) includes shaped tubular elements 60 (59) — see Figure 6b — which meet at a block 58 (61) having a hole (not shown) formed therein and which are telescopically connected to the tubular elements 54 (55). The telescopic connections on the frames 4 and 5 enable the lengths of the latter to be adjusted. Once the lengths of the frame 4 and 5 have been suitably adjusted, they can be releasably locked in position by locking means 62 and 63, respectively. As can be seen in Figure 1, the patient-supporting frame 4 is connected to the supporting frame 3 by inserting one of the screw-threaded spindles of each of the support members 44 and 45 through the holes formed in the blocks 56 and 58, respectively. The handles 48b and 49b are then screwed on to these spindles to secure the frame 4 in position. In a similar manner the patient-supporting frame 5 can be secured to the other of the screw-threaded spindles of each of the support members 44 and 45 with the aid of the handles 48a and 49a to provide, with the frame 4, a cage for encasing a patient supported on the bed 1.

On each side of the bed 1 there is provided an arm rest generally designated by the reference numeral 71 (not shown in Figure 3 and only one arm rest can be seen in Figures 1 and 2). Each arm rest 71 comprises a substantially vertically disposed rod 72 slidably received in a locking device 73 fixed to each side of the undercarriage 6. The upper end of each rod 72 pivotally supports an arm resting frame 74 which is pivotable between a substantially horizontal, operative position (see Figure 2) and a substantially vertical, inoperative position (see Figure 1). The frame 74

is supported in its horizontal, operative position by a stay 75. Actuation of the locking device 73 enables the height of each arm rest 71 to be adjusted.

- 5 As previously mentioned the locking means 50 lock each of the support members 44 and 45 in one of two positions, and carry one of the patient-supporting frames 4 (or 5) on their downwardly-extending screw-threaded spindles, the frame 4
10 (or 5) may be supported in this position by a pair of holding devices 80 and 81 (omitted for clarity from Figure 3). Each holding device 80 (81) comprises a rod 82 (only one of which can be seen in Figures 1 and 2) connected to the tubular
15 element 36 (37). Surrounding the rod 82 is a fixed, first sleeve 84 (only one of which can be seen in Figure 1) and a movable, second sleeve 86 (87) provided with locking means (now shown) actuatable by a lever 88 (89) to lock the second
20 sleeve in any position along the rod 82. Link rods 90, 91 (92, 93) are pivotally connected at one of their ends to the sleeves 84 and 86 (87), respectively, and at their other ends to a supporting member 94 (95). By adjusting the
25 position of the second sleeves 86, 87 along the rods 82, 83 the supporting members may be brought beneath a supporting element 65 of the frame 4 (5).

- As previously mentioned the rails 36 and 37 of
30 the supporting frame 3 are supported on the rollers 32, 33 and 34, 35 respectively. This enables the supporting frame 3 to be moved longitudinally with respect to the turnable frame 7. In order to lock the supporting frame 3 fast with respect to the turnable frame, a locking device (see
35 Figures 4 and 5) is provided for releasably locking the rails 36 and 37 to the angular elements 23 and 24, respectively. The locking device comprises a brake block 100 pivotally connected to each of
40 the flanges 23a and 24a and a brake pad 100a and 100b also connected to the flanges 24a and 23a, respectively. The brake blocks are also pivotally connected to rigid rods 101 and 102 which themselves are pivotally connected to the
45 periphery of a wheel 103 turnably mounted to a tubular cross element 104 extending between the angular elements 23 and 24. By turning a lever 105 connected to the wheel 103, the latter can be turned through an angle of approximately 50°
50 between two limit positions, whereby in one limit position the brake blocks occupy inner positions (shown in chain lines in Figure 4) and in the other limit position the brake blocks occupy outer positions in which the rails 36, 37 are pressed
55 against the brake pads 100a 100b respectively. (In Figure 4 the full lines position of the brake block 100 represents the position of the brake block 100 when almost in its outer position). When the brake blocks are in their inner positions
60 the rails 36, 37 can be moved over the rollers 32 to 35 to adjust the longitudinal position of the supporting frame 3 relative to the turnable frame 7. A clip 106 (only one of which is shown in Figure 4) is attached to each of the brake pads 100a and
65 100b. Each clip 106 partly surrounds, but is

spaced from, each of the rails 36 and 37, respectively, and acts to prevent the supporting frame from accidentally lifting upwards off the understructure 2 when the frame 3 is slid along the rollers 32 to 35. However, the resilience of the clips can be overcome if it is deliberately required to lift the frame 3 upwardly off the understructure 2 when the brake blocks occupy their inner positions. The frame 3 can also be removed from the understructure 2 by sliding the frame 3 off the end of the turnable frame 7. When the brake blocks 100 are in their outer positions, each brake block 100 is pressed firmly against its associated rail 36 or 37. The supporting frame 3 may be
70 firmly locked in position with respect to the turnable frame 7 even if no brake pads 100a 100b are provided, and for this reason it is not essential for the brake pads 100a, 100b to be provided.

A tray 170 for medical instruments is removably attached to one end of the understructure 2.

In another embodiment (not shown) of apparatus according to the invention, the first frame 7, instead of being pivotally connected to the wheeled undercarriage 6, is supported in a cradle-like support mounted in the undercarriage 6. In this case the frame 7 is provided with spaced apart and parallel arcuate runners, possibly carrying rollers, engageable with similarly spaced apart 'rails' of the cradle-like support.

In other embodiments of the invention (also not shown), other types of locking devices could be employed for locking the first frame 7 to the undercarriage 6 and for locking and supporting the patient-supporting frames 4 and 5 in position.

CLAIMS

1. An apparatus for supporting a patient comprises a rigid undercarriage carrying a rigid first frame turnable about a horizontal first axis, a rigid second frame slidably supported on said first frame and extending longitudinally in a direction perpendicular to said first axis, first releasable locking means for locking the second frame in different positions on said first frame, patient-supporting means carried by said second frame and rotatable about a second axis parallel to the longitudinal direction of said second frame for turning a patient, supported in said patient-supporting means parallel to said second axis, through at least 180°, and second releasable locking means for locking the patient-supporting means in one or more predetermined positions.

2. An apparatus according to claim 1, in which rollers are provided for facilitating sliding of the second frame relative to the first frame.

3. An apparatus according to claim 2, in which each of said rollers has a grooved circumferential rim.

4. An apparatus according to claim 2 or 3, in which said rollers are rotatably fixed to the first frame and are spaced apart to support a pair of spaced apart parallel rails forming part of the second frame.

5. An apparatus according to claim 4, in which

the first releasable locking means comprises a pair of movable brake shoes which are movable into or out of contact with different ones of said pair of spaced apart parallel rails to prevent or enable, respectively, sliding movement of the second frame on said first frame.

6. An apparatus according to claim 5, in which each brake shoe is movable to clamp each of said pair of spaced apart parallel rails against a respective brake pad fixed to the first frame.

7. An apparatus according to claim 5 or 6, in which the first releasable locking means further comprises actuating means for moving the pair of movable brake shoes at the same time into or out of contact with respective ones of said pair of spaced apart parallel rails.

8. An apparatus according to any of the preceding claims, comprising stop means to prevent the second frame from accidentally lifting upwardly off the said first frame during sliding movement of the second frame on the first frame.

9. An apparatus according to claim 8, in which the or each stop means is movable, e.g. resiliently, to enable the second frame to be lifted off the first frame when desired and when the first releasable locking means are positioned to enable sliding of the second frame on the first frame.

10. An apparatus according to any of the preceding claims, in which the first frame is pivotally supported for pivoting about said horizontal first axis.

11. An apparatus according to any of the preceding claims, comprising a pair of carrier members rotatably carried on different ones of a pair of longitudinally spaced apart, fixed supporting means forming part of the rigid second frame, which carrier members are located inwardly of the fixed supporting means and detachably carry the said patient-supporting means.

12. An apparatus according to claim 11, in which the second releasable locking means comprises a locking device associated with the or each fixed supporting means and the carrier member supported thereby for releasably locking the or each associated pair of supporting means and carrier member fast with respect to each other.

13. An apparatus according to claim 12, in which the or each locking device comprises a locking pin carried in one of the associated pair of supporting means and carrier member, and at least one hole, provided in the other of the associated pair of supporting means and carrier member, into which, or out of which, the locking

pin is movable.

14. An apparatus according to any of claims 11 to 13, in which the patient-supporting means consists of a pair of patient-supporting frames each detachably fixed to said carrier members.

15. An apparatus according to any of the preceding claims, comprising holding means carried on said second frame and movable into a position to support the patients-supporting means when the latter is in said one or more predetermined positions.

16. An apparatus according to any of the preceding claims, in which the lengths of the second frame and of the patient-supporting means are adjustable, e.g. telescopically adjustable.

17. An apparatus according to any of the preceding claims in which the undercarriage is provided with wheels.

18. An apparatus according to claim 17, in which at least one of the wheels is provided with a brake.

19. An apparatus according to any of the preceding claims, having a vertically adjustable arm rest fixed to each side of the undercarriage.

20. An apparatus according to any of the preceding claims, in which a fluid actuated ram is connected between the undercarriage and the first frame to effect turning of the frame about said horizontal first axis.

21. An apparatus according to any of the preceding claims, in which a releasable locking device is connected between the undercarriage and the first frame to enable the first frame to be releasably locked at any desired inclination.

22. An apparatus for supporting a patient comprises a rigid undercarriage carrying a rigid first frame turnable about a horizontal first axis, a rigid second frame detachably supported on said first frame and extending longitudinally in a direction perpendicular to said first axis, first releasably locking means for locking the second frame to said first frame, patient-supporting means carried by said second frame and rotatable about a second axis parallel to the longitudinal direction of said second frame for turning a patient, supported in said patient-supporting means parallel to said second axis, through at least 180°, and second releasable locking means for locking the patient-supporting means in one or more predetermined positions.

23. An apparatus for supporting a patient, which apparatus is constructed and arranged substantially as herein described with reference to, and as illustrated in Figures 1 to 5 and Figures 6a and 6b of the accompanying drawings.